NVM Express Technical Errata

Errata ID	**019**
Change Date	**2/13/2012**
Affected Spec Ver.	**NVM Express 1.0b**
Corrected Spec Ver.	

Submission info

Name	Company	Date
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This erratum makes the number of command sets reported and the number of command sets that may be selected consistent.

Editorial changes are made to several commands in section 5.

Description of the specification technical flaw

Update bits 47:37 in the Controller Capabilities register in section 3.1.1 as shown below:

<table>
<tr><td>47:45
~~47:41~~</td><td>RO</td><td>0h</td><td>Reserved</td></tr>
<tr><td>44:37
~~40:37~~</td><td>RO</td><td>Impl Spec</td><td>Command Sets Supported (CSS): This field indicates the I/O Command Set(s) that the controller supports. A minimum of one command set shall be supported. The field is bit significant. If a bit is set to ‘1’, then the corresponding I/O Command Set is supported. If a bit is cleared to ‘0’, then the corresponding I/O Command Set is not supported.
<table>
<tr><th>Bit</th><th>Definition</th></tr>
<tr><td>37</td><td>NVM command set</td></tr>
<tr><td>38</td><td>Reserved</td></tr>
<tr><td>39</td><td>Reserved</td></tr>
<tr><td>40</td><td>Reserved</td></tr>
<tr><td>41</td><td>Reserved</td></tr>
<tr><td>42</td><td>Reserved</td></tr>
<tr><td>43</td><td>Reserved</td></tr>
<tr><td>44</td><td>Reserved</td></tr>
</table>
</td></tr>
</table>

Update the first two paragraphs of section 5.5 as shown below:

The Delete I/O Completion Queue command is used to delete an I/O Completion Queue. The Delete I/O Completion Queue command uses the Command Dword 10 field. All other command specific fields are reserved. After this command has completed, the PRP List that describes the Completion Queue may be deallocated by host software.

Host software ~~Software~~ shall ensure that any associated I/O Submission Queue is deleted prior to deleting a Completion Queue. If there are any associated I/O Submission Queues present, then the Delete I/O Completion Queue command shall fail with a status value of Invalid Queue Deletion.

Update the first two paragraphs of section 5.6 as shown below:

The Delete I/O Submission Queue command is used to delete an I/O Submission Queue. The Delete I/O Submission Queue command uses the Command Dword 10 field. All other command specific fields are reserved. After this command has completed, the PRP List that describes the Submission Queue may be deallocated by host software.

The command causes all commands issued to the indicated Submission Queue that are still in progress to be aborted. The controller ~~does not need to~~ may post individual completion status of Command Aborted due to SQ Deletion for commands that have been aborted. Commands that are not able to be aborted should be completed with appropriate completion status.

Update the first paragraph of section 5.6.1 as shown below:

After all commands issued to the indicated I/O Submission Queue are either completed or aborted, a completion queue entry is posted to the Admin Completion Queue when the queue has been deleted. ~~The completion queue entry shall indicate if commands were aborted.~~ Delete I/O Submission Queue command specific errors are defined in Figure 43.

Update the first paragraph of section 5.7 as shown below:

The Firmware Activate command is used to verify that a valid firmware image has been downloaded and to commit that revision to a specific firmware slot. The host may select the firmware image to activate on the next controller reset (CC.EN transitions from '1' to '0', a PCI function level reset, and/or other controller reset) as part of this command. The currently executing firmware revision may be determined from the Firmware Revision field of the Identify Controller data structure in Figure 65 or as indicated in the Firmware Slot Information log page.

Update the Activate Action field of Figure 44 as shown below:

<table>
<tr><td>04:03</td><td>Activate Action (AA): This field ~~indicates~~ specifies the action that is taken on the image downloaded with the Firmware Image Download command or on a previously downloaded and placed image. The actions are indicated in the following table.
<table>
<tr><th>Value</th><th>Definition</th></tr>
<tr><td>00b</td><td>Downloaded image replaces the image indicated by the Firmware Slot field. This image is not activated.</td></tr>
<tr><td>01b</td><td>Downloaded image replaces the image indicated by the Firmware Slot field. This image is activated at the next reset.</td></tr>
<tr><td>10b</td><td>The image indicated by the Firmware Slot field is activated at the next reset.</td></tr>
<tr><td>11b</td><td>Reserved</td></tr>
</table></td></tr>
</table>

Update the first paragraph of section 5.9 as shown below:

The Get Features command retrieves the attributes of the Feature ~~indicated~~ specified.

Update Figure 50 as shown below:

Bit	Description
63:00	**PRP Entry 1 (PRP1):** ~~Indicates~~ Specifies a data buffer that the Feature information shall be returned in if the Feature information is ~~specified~~ returned in a data structure. The buffer shall not have more than one physical discontinuity. If no data structure is used as part of the specified feature, then this field is ~~not used~~ ignored.

Update Figure 51 as shown below:

Bit	Description
63:00	**PRP Entry 2 (PRP2):** This field contains the second PRP entry that specifies the location where data should be transferred to (if there is a physical discontinuity). This field shall not be a pointer to a PRP List. If no data structure is used as part of the specified feature, then this field is ~~not used~~ ignored.

Update Figure 52 as shown below:

Bit	Description
31:08	Reserved
07:00	**Feature Identifier (FID):** This field ~~indicates~~ specifies the identifier of the Feature for which to provide data.

Update Figure 53 as shown below:

~~Feature Identifier~~	~~Persistent Across Power States~~	~~Uses Memory Buffer for Attributes~~	Description	Section Defining Format of Attributes Returned
~~01h~~	~~No~~	~~No~~	Arbitration	Section 5.12.1.1
~~02h~~	~~No~~	~~No~~	Power Management	Section 5.12.1.2
~~03h~~	~~Yes~~	~~Yes~~	LBA Range Type	Section 5.12.1.3
~~04h~~	~~No~~	~~No~~	Temperature Threshold	Section 5.12.1.4
~~05h~~	~~No~~	~~No~~	Error Recovery	Section 5.12.1.5
~~06h~~	~~No~~	~~No~~	Volatile Write Cache	Section 5.12.1.6
~~07h~~	~~No~~	~~No~~	Number of Queues	Section 5.12.1.7
~~08h~~	~~No~~	~~No~~	Interrupt Coalescing	Section 5.12.1.8
~~09h~~	~~No~~	~~No~~	Interrupt Vector Configuration	Section 5.12.1.9
~~0Ah~~	~~No~~	~~No~~	Write Atomicity	Section 5.12.1.10
~~0Bh~~	~~No~~	~~No~~	Asynchronous Event Configuration	Section 5.12.1.11
NVM Command Set Specific				
~~80h~~	~~Yes~~	~~No~~	Software Progress Marker	Section 5.12.1.12

Update section 5.9.1 as shown below:

A completion queue entry is posted to the Admin Completion Queue ~~when~~ if the controller has completed returning any attributes associated with the Feature. Depending on the Feature Identifier, Dword 0 of the completion queue entry may contain feature information (refer to section 5.12.1).

Modify Figure 18 as shown below:

Figure 18: Status Code – Command Specific Errors Values

Value	Description	Commands Affected
00h	Completion Queue Invalid	Create I/O Submission Queue
01h	Invalid Queue Identifier	Create I/O Submission Queue, Create I/O Completion Queue, Delete I/O Completion Queue, Delete I/O Submission Queue
02h	Maximum Queue Size Exceeded	Create I/O Submission Queue, Create I/O Completion Queue
03h	Abort Command Limit Exceeded	Abort
04h	Reserved	Reserved
05h	Asynchronous Event Request Limit Exceeded	Asynchronous Event Request
06h	Invalid Firmware Slot	Firmware Activate
07h	Invalid Firmware Image	Firmware Activate
08h	Invalid Interrupt Vector	Create I/O Submission Queue
09h	Invalid Log Page	Get Log Page
0Ah	Invalid Format	Format NVM
0Bh	Firmware Application Requires Conventional Reset	Firmware Activate
0Ch	Invalid Queue Deletion	Delete I/O Completion Queue
0Dh – 7Fh ~~0Ch – 7Fh~~	Reserved	
80h - BFh	I/O Command Set Specific	
C0 - FFh	Vendor Specific	

Modify Figure 41 as shown below:

Figure 41: Delete I/O Completion Queue – Command Specific Errors Values

Value	Description
1h	**Invalid Queue Identifier:** The Queue Identifier specified in the command is invalid. This error is also indicated if the Admin Completion Queue identifier is specified.
0Ch	**Invalid Queue Deletion:** This error indicates that it is invalid to delete the I/O Completion Queue specified. The typical reason for this error condition is that there is an associated I/O Submission Queue that has not been deleted.

Disposition log

8/10/2011	Erratum captured.
8/16/2011	Deleted Feature Identifier column in Figure 53, CQ delete fails if associated SQ present.
8/24/2011	Added Invalid Queue Deletion error.
10/3/2011	Erratum ratified.
2/13/2012	Corrected Invalid Queue Deletion to use status code 0Ch.
3/27/2012	Erratum re-ratified.